

SIMTRUM

Software Operation Manual

SIMTRUM-HC-C Software Operation Tutorial

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Chapter 1 Software Overview

1.1 Introduction

SIMTRUM-HC-C is the companion control software for the SIMTRUM hot and cold stage system, designed for temperature control, temperature ramp program editing, test data recording, and analysis. This manual provides detailed instructions on the operation methods and precautions for each functional module of the software.

1.2 Scope of Application

This manual is intended for operators using the SIMTRUM-HC-C software for hot and cold stage temperature control, covering the complete workflow from software installation and configuration, parameter setting, test execution, to data retrieval.

Chapter 2 Main Interface

After launching the SIMTRUM-HC-C software, the main interface is displayed. The main interface consists of the following four areas:

- **Menu Bar:** Provides access to all system functions, including Settings, Test Information, Test Configuration, Analysis, About, and other menu items.
- **Shortcut Bar:** Integrates frequently used function buttons for quick access.
- **Left Sidebar:** Displays test information and temperature control parameters, presenting the current temperature status in real time.
- **Bottom Status Bar:** Displays the temperature controller communication status and system operating status in real time, including temperature readings, operating mode, and other information.

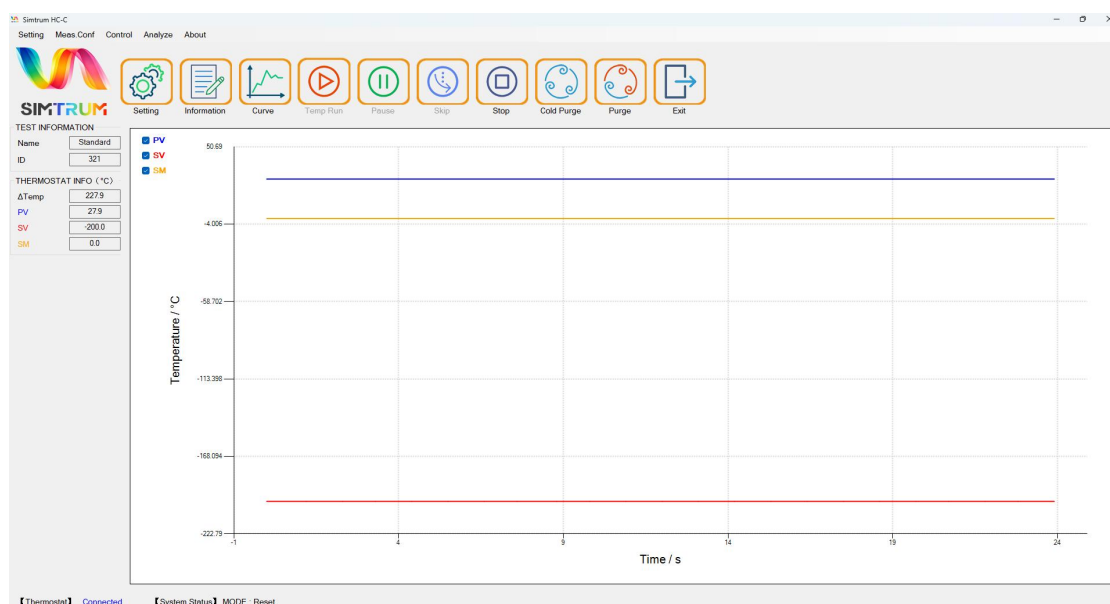


Figure 2-1 SIMTRUM-HC-C Software Main Interface

Chapter 3 System Settings

3.1 Device Settings Access

Click [Settings] on the main interface menu bar or the [System Settings] button on the shortcut bar to open the Device Settings dialog. The Device Settings dialog includes multiple configuration tabs such as Temperature Controller Communication, Temperature Unit, Purge Settings, and Temperature Control Settings.

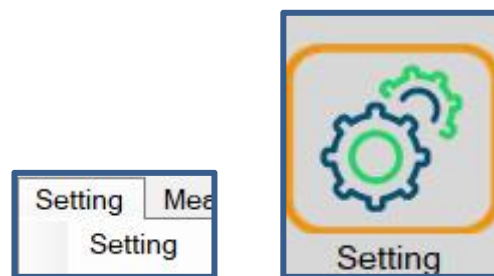


Figure 3.1-1 Device Settings Access

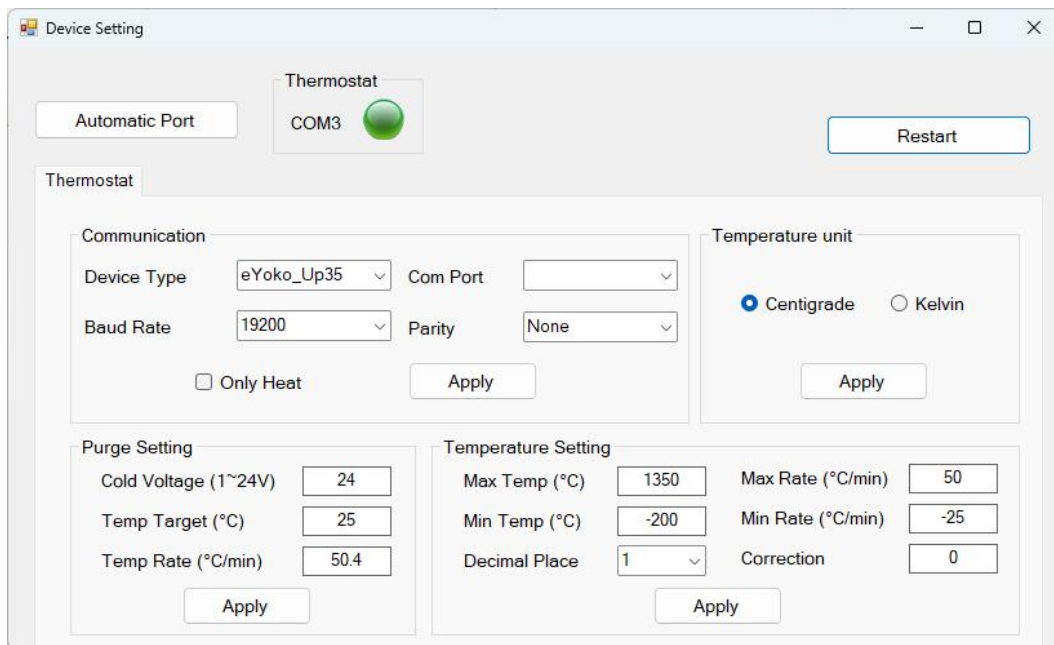


Figure 3.1-2 Device Settings Dialog

After re-selecting the temperature controller parameters, click [Apply] and then click [Restart]. The software will automatically restart and reconfigure the parameters.

3.2 Temperature Controller Communication

If communication with the temperature controller is lost (the bottom status bar on the main interface displays “Temperature Controller Disconnected” and the status indicator in System Settings is red), follow these steps to restore communication:

- Click the [Auto Detect] button, and the system will automatically search for and connect to available serial ports.
- Once connected, the status indicator will turn green.
- The bottom status bar on the main interface will display “Temperature Controller Connected” , indicating that communication has been restored.

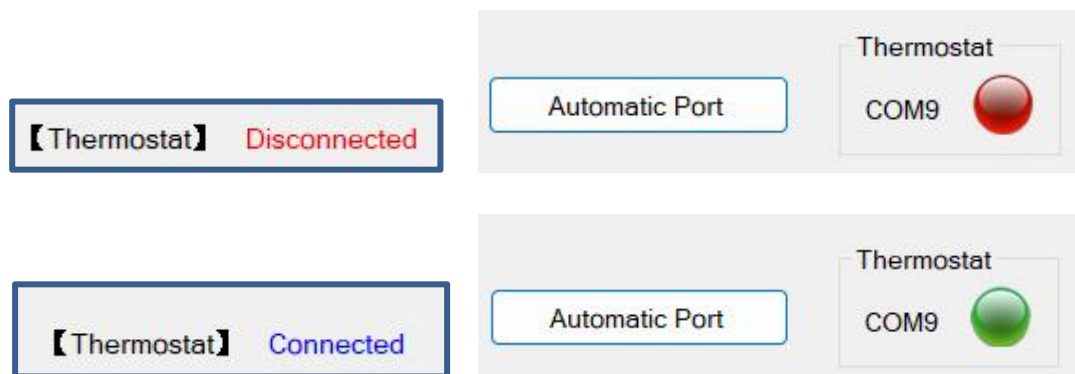


Figure 3.2-1 Temperature Controller Connection Status Change

After re-selecting temperature controller parameters, click [Apply] and then [Restart]; the software will automatically restart and reconfigure.

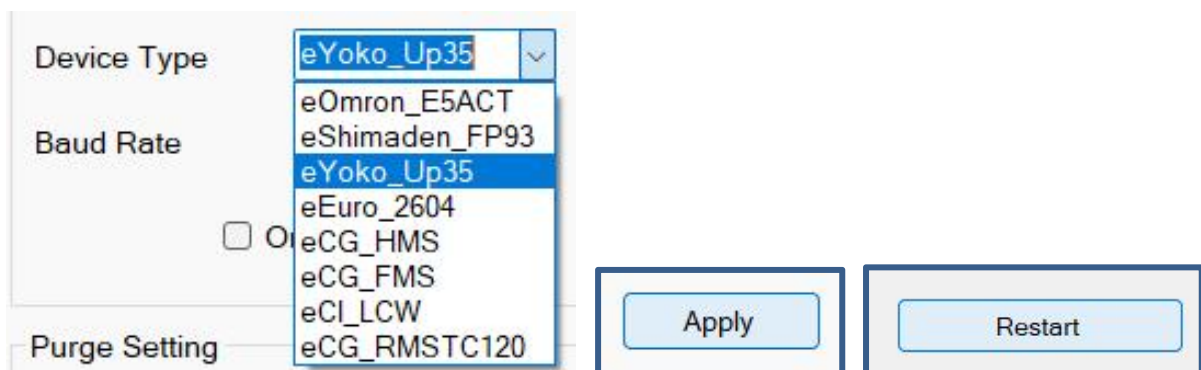
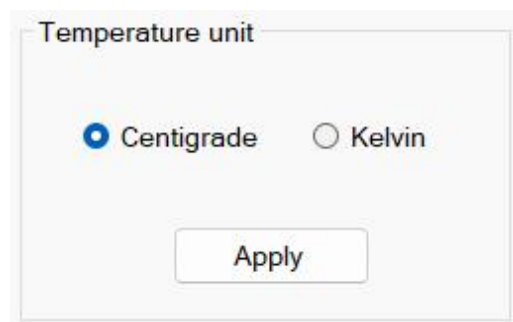


Figure 3.2-2 Temperature Controller Model Settings

3.3 Temperature Unit Settings

The system uses Celsius (°C) by default. If needed, you can switch to Kelvin (K), at which point all temperature units in the interface will automatically change from °C to K, and the corresponding values will be converted simultaneously.

All temperature data is saved to the record file in the user-set unit (°C or K). Please select the appropriate temperature unit according to your actual requirements.



Temperature unit

☒ Centigrade ☐ Kelvin

Apply

Figure 3.3-1 Temperature Unit Settings (°C and K Switching)

THERMOSTAT INFO (°C)

ΔTemp: 227.8

PV: 27.8

SV: -200.0

SM: 0.0

THERMOSTAT INFO (K)

ΔTemp: 227.7

PV: 300.9

SV: 73.2

SM: 273.2

Numbers of Heating Segment: 3

Number of Program Executions: 1

	Temp (°C)	Time (s)	Rate (°C/min)	Calculation time
	30.5	5		=
	33	30	5	=
▶	33	22		=

Numbers of Heating Segment: 3

Number of Program Executions: 1

	Temp (K)	Time (s)	Rate (K/min)	Calculation time
	303.35	5		=
	306	32	5	=
▶	306	22		=

Sample Info			
Sample Name	:	Standard	
Sample ID	:	321	
Operator	:	Admin	
Correction(°C)	:	0	

Test Time	PV(°C)	SV(°C)	SM(°C)
16:44:02.625	28.90	28.90	0.000
16:44:03.719	28.90	28.90	0.000
16:44:04.858	28.90	28.90	0.000
16:44:05.937	28.90	28.90	0.000
16:44:07.008	28.80	28.90	0.000
16:44:08.114	28.80	29.00	0.000

Sample Info			
Sample Name	:	Standard	
Sample ID	:	321	
Operator	:	Admin	
Correction(K)	:	0	

Test Time	PV(K)	SV(K)	SM(K)
09:13:01.482	301.85	301.85	273.150
09:13:02.719	301.85	301.85	273.150
09:13:03.794	301.85	301.85	273.150
09:13:04.889	301.85	301.85	273.150
09:13:06.011	301.85	301.85	273.150
09:13:07.111	301.85	301.95	273.150
09:13:08.246	301.85	302.05	273.150

Figure 3.3-2 Interface Display Comparison under Different Temperature Units

3.4 Purge Settings

Purge Settings are used for parameter configuration during the cooling process, including two stages: Fast Purge and Room Temperature Purge:

- [Pump Voltage]: Controls the cooling intensity during the Fast Purge stage. Higher voltage results in faster cooling; lower voltage results in slower cooling.
- [Target Temperature] and [Ramp Rate]: Used for the Room Temperature Purge stage, indicating that the system heats up from the current lowest temperature to the target temperature at the set ramp rate.

Purge Setting

Cold Voltage (1~24V)

Temp Target (°C)

Temp Rate (°C/min)

Figure 3.4-1 Purge Settings Interface



Figure 3.4-2 Purge Buttons

3.5 Temperature Control Settings

Temperature Control Settings include the following key parameters:

- [Max Temperature], [Min Temperature], [Max Rate], and [Min Rate]: These are related to the pump operating voltage. When these parameters are modified, the system will automatically update the corresponding pump voltage mapping table. All parameters currently use default values.
- [Decimal Places]: This setting depends on the connected temperature controller model. For details on specific compatible controller models, please contact the company' s technical support for confirmation.
- [Temperature Offset]: An advanced feature for engineers, used to improve temperature tracking performance by offsetting the setpoint when the actual sample temperature is significantly lower than the set temperature for an extended period.

Temperature Setting			
Max Temp (°C)	1350	Max Rate (°C/min)	50
Min Temp (°C)	-200	Min Rate (°C/min)	-25
Decimal Place	1	Correction	0
Apply			

Figure 3.7 Temperature Control Settings Interface

Chapter 4 Test Information

Click the [Test Information] button on the main interface menu bar or shortcut bar to open the Information Settings dialog. In this dialog, you can set basic information related to the current test, including test name, sample information, operator, test remarks, etc.

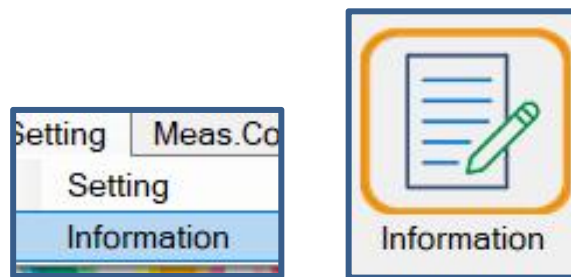


Figure 4-1 Test Information Access

Figure 4-2 Test Information Settings Dialog

Chapter 5 Test Configuration

Click the [Test Configuration] button on the main interface menu bar or shortcut bar to open the Test Configuration dialog. In Test Configuration, you can set the number of segments for the temperature program and the temperature curve parameters for each segment.

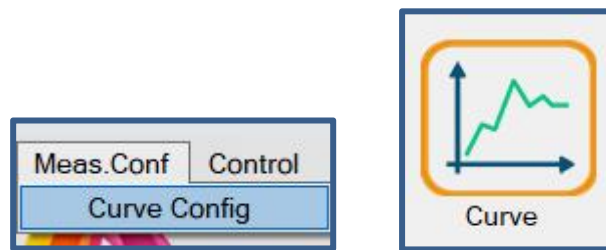


Figure 5-1 Test Configuration Access

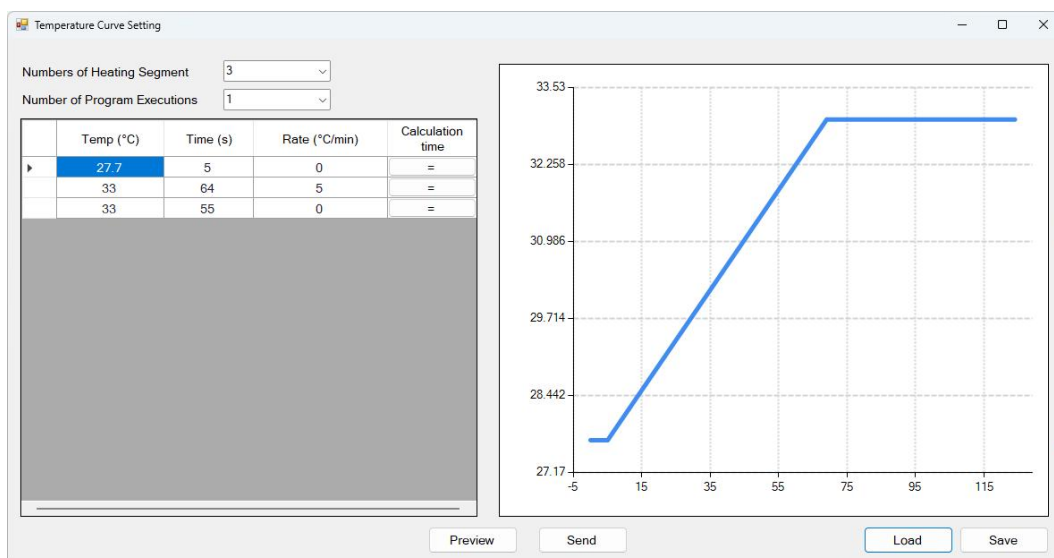


Figure 5-2 Test Configuration Dialog

5.1 Segment Count Settings

Different temperature controller models support different maximum numbers of segments. For example, the eYoko_Up35 model supports sending up to 20 program

segments. Please select the appropriate number of segments based on the actual temperature controller model you are using.

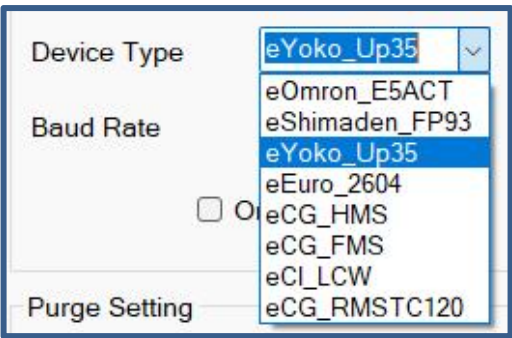


Figure 5.1-1 Temperature Controller Model

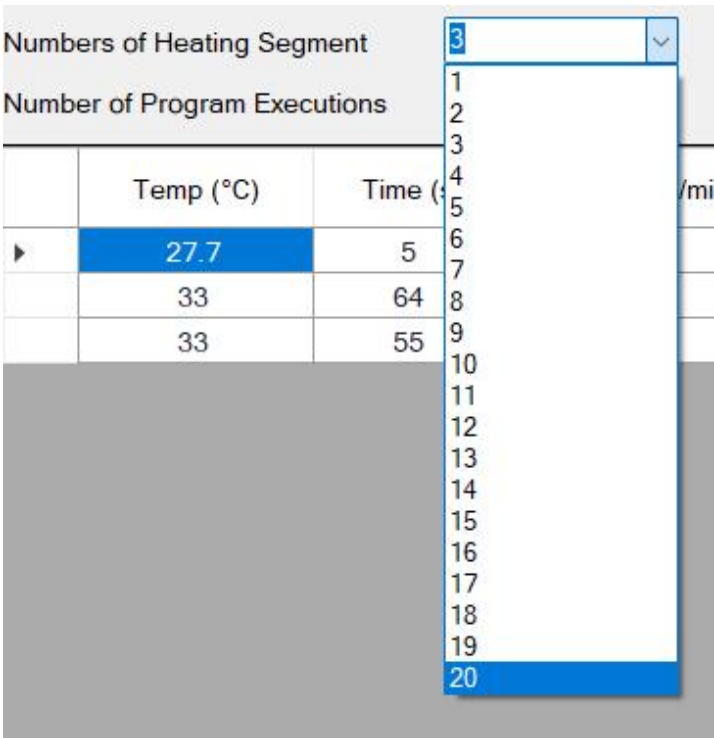


Figure 5.1-2 Segment Count Settings

5.2 Temperature Curve Settings

In the Test Configuration dialog, you can set the target temperature, ramp rate, and duration for each temperature segment.

The maximum duration for each temperature segment is 5,999 seconds. If a longer constant-temperature hold time is required (e.g., 16,000 seconds), please split it into multiple consecutive segments at the same temperature, with each segment not exceeding 5,999 seconds.

For example, 16,000 seconds can be split into: 5,999 s + 5,999 s + 4,002 s.

After completing the temperature curve settings, click the [Send Parameters] button to send the configured program parameters to the temperature controller.

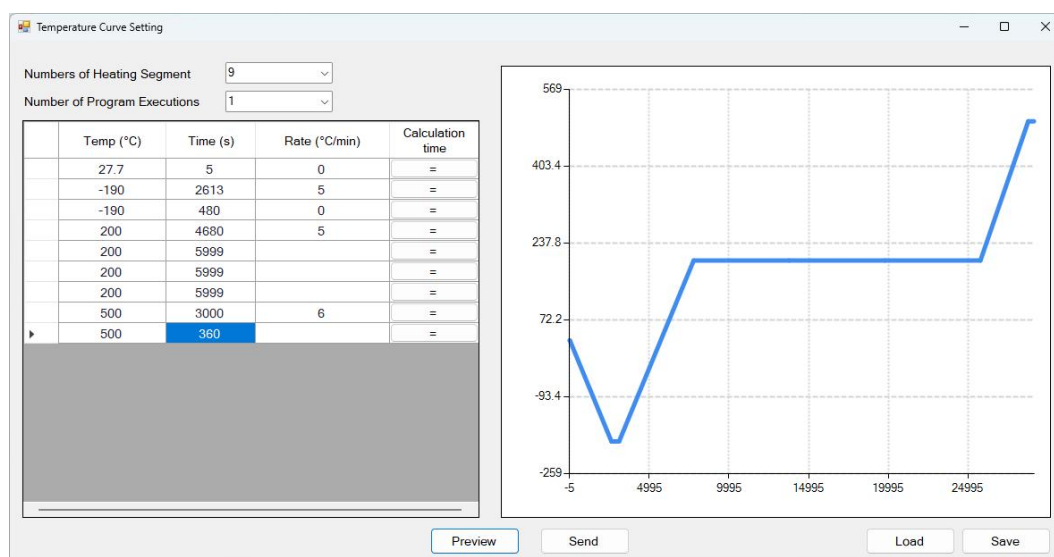


Figure 5.2-1 Temperature Curve Settings Interface

Chapter 6 Pump Voltage Mapping

Click the [About] button on the main interface menu bar to open the menu options, then select [Pump Voltage Mapping Table] to open the mapping table dialog.

The values in the dialog are used by default. Unless there is a special requirement, you can click on table cells to modify them. The pump voltage mapping table is used to define the pump operating voltage corresponding to different temperature ranges, which directly affects the cooling and purge effectiveness.

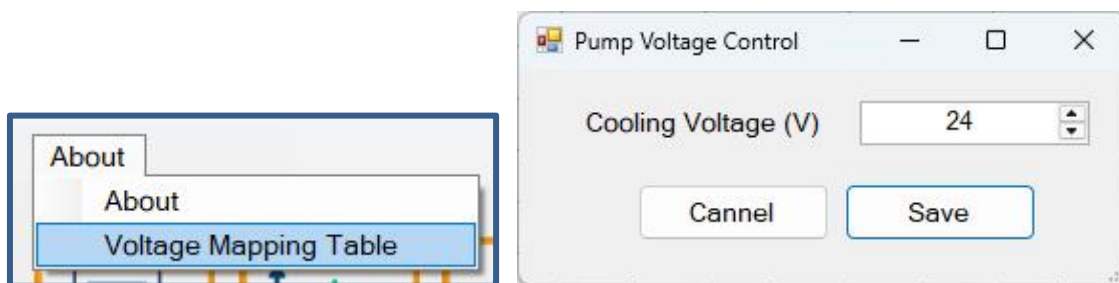


Figure 6-1 Pump Voltage Mapping Table Dialog

	-25 ~ -21 (°C/min)	-21 ~ -16 (°C/min)	-16 ~ -11 (°C/min)	-11 ~ -6 (°C/min)	-6 ~ -2 (°C/min)	-2 ~ 3 (°C/min)	0 ~ 8 (°C/min)	8 ~ 12 (°C/min)	12 ~ 17 (°C/min)	17 ~ 22 (°C/min)	22 ~ 26 (°C/min)	26 ~ 31 (°C/min)	31 ~ 36 (°C/min)	36 ~ 40 (°C/min)	40 ~ 45 (°C/min)	45 ~ 50 (°C/min)
200 ~ -150 (°C)	24	24	24	23	22	21	24	19	18	17	16	15	8	8	8	8
-150 ~ -100 (°C)	22	21	22	20	19	18	20	18	17	16	15	15	8	8	8	8
-100 ~ -50 (°C)	20	19	20	18	18	17	18	16	16	15	14	14	8	8	8	8
-50 ~ 0 (°C)	18	18	17	17	16	16	14	15	15	14	14	13	8	8	8	8
0 ~ 50 (°C)	16	16	15	15	15	14	12	14	13	13	13	12	8	8	8	8
50 ~ 100 (°C)	14	14	14	13	13	13	6	6	6	6	6	6	8	8	8	8
100 ~ 150 (°C)	12	12	12	12	12	11	4	4	4	4	4	4	8	8	8	8
150 ~ 200 (°C)	11	10	9	8	7	6	2	2	2	2	2	2	6	6	6	6
200 ~ 250 (°C)	10	9	8	7	6	6	0	0	0	0	0	0	4	4	4	4
250 ~ 300 (°C)	9	8	7	6	6	6	0	0	0	0	0	0	2	2	2	2
300 ~ 350 (°C)	8	7	6	6	6	6	0	0	0	0	0	0	0	0	0	0
350 ~ 400 (°C)	7	6	6	6	6	6	0	0	0	0	0	0	0	0	0	0
400 ~ 450 (°C)	6	6	6	6	6	6	0	0	0	0	0	0	0	0	0	0
450 ~ 500 (°C)	6	6	6	6	6	6	0	0	0	0	0	0	0	0	0	0
500 ~ 550 (°C)	6	6	6	6	6	6	0	0	0	0	0	0	0	0	0	0
550 ~ 600 (°C)	6	6	6	6	6	6	0	0	0	0	0	0	0	0	0	0
600 ~ 650 (°C)	6	6	6	6	6	6	0	0	0	0	0	0	0	0	0	0

Figure 6-2 Pump Voltage Mapping Table Detailed Parameters

Chapter 7 Test Execution

After setting up the temperature ramp curve in [Test Configuration], click the [Send] button (i.e., [Send Parameters]). The system will pop up a dialog showing “Processing Data” and the progress.

Once the progress reaches 100%, the dialog will automatically close and return to the main interface, and the temperature ramp program will begin execution.

- After the program starts executing, the bottom status bar on the main interface displays [Mode: Program].
- After the temperature ramp program is completed, the status bar displays [Mode: Standby].

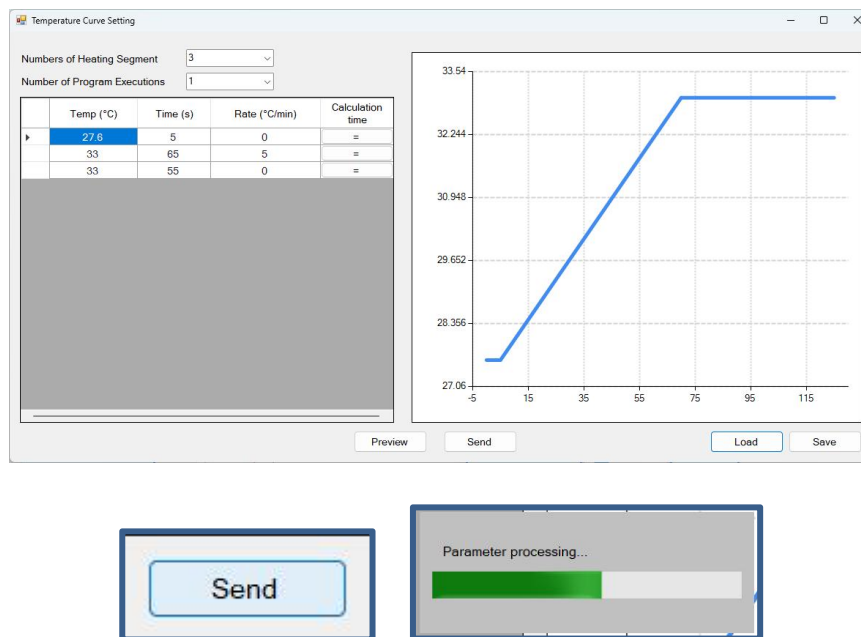


Figure 7-1 Parameter Sending Progress Dialog

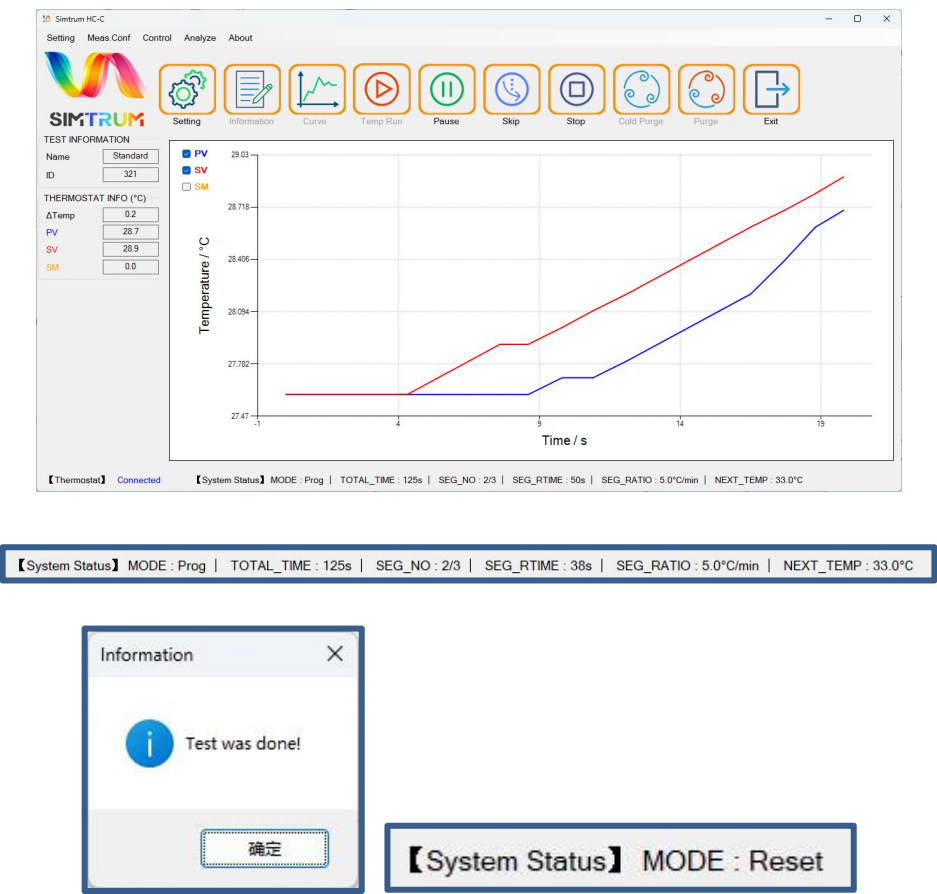


Figure 7-2 Temperature Ramp Program Execution Status

Chapter 8 History Records

Click [Analysis] on the menu bar to reveal the [Temperature Curve Records] menu option. Click it to open the History Records dialog. In the history records, you can view temperature curve data from previous tests.

Saved data records are stored in the Data\WinTemp directory under the current installation file path. The files can be opened and viewed using the system Notepad.

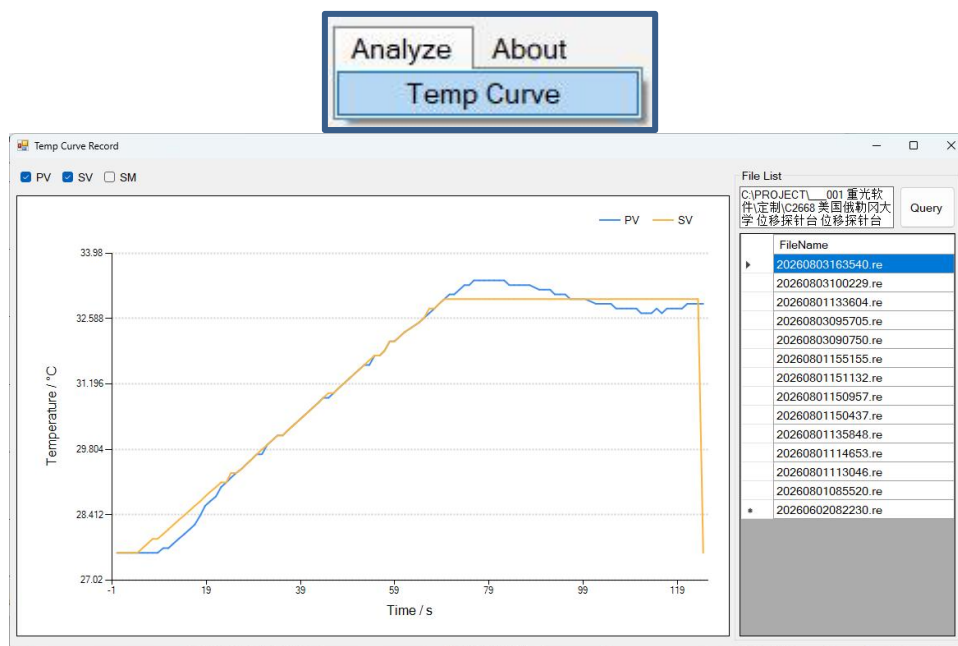
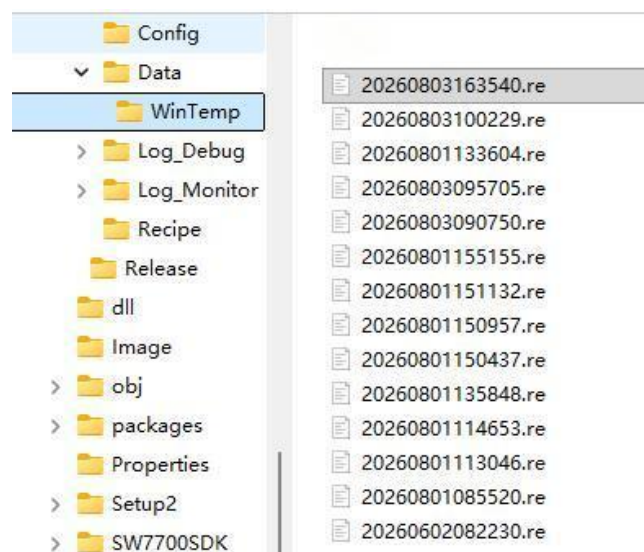


Figure 8-1 History Records Dialog



[illegible]

Figure 8-2 History Data File Viewing

Chapter 9 Other Functions

The shortcut bar and menu bar also provide the following commonly used operation functions:

-  [Stop]: Stops the current program RUN state.
-  [Cold Gas Purge]: Cools down using the liquid nitrogen pump at maximum speed, suitable for scenarios requiring rapid cooling.
-  [Temperature Ramp Purge]: The system defaults to a target of 20°C for temperature ramping. Users can open [Device Settings] to change the set [Target Temperature], allowing the system to quickly ramp toward the target temperature.
-  [Exit]: Exits the software.

Appendix Pause and Skip

A.1 Pause Function

When the [System Status] mode is Standby, the [Pause] and [Skip] buttons on the shortcut bar are unavailable. When the [System Status] mode is Program, the [Pause] and [Skip] buttons can be used.

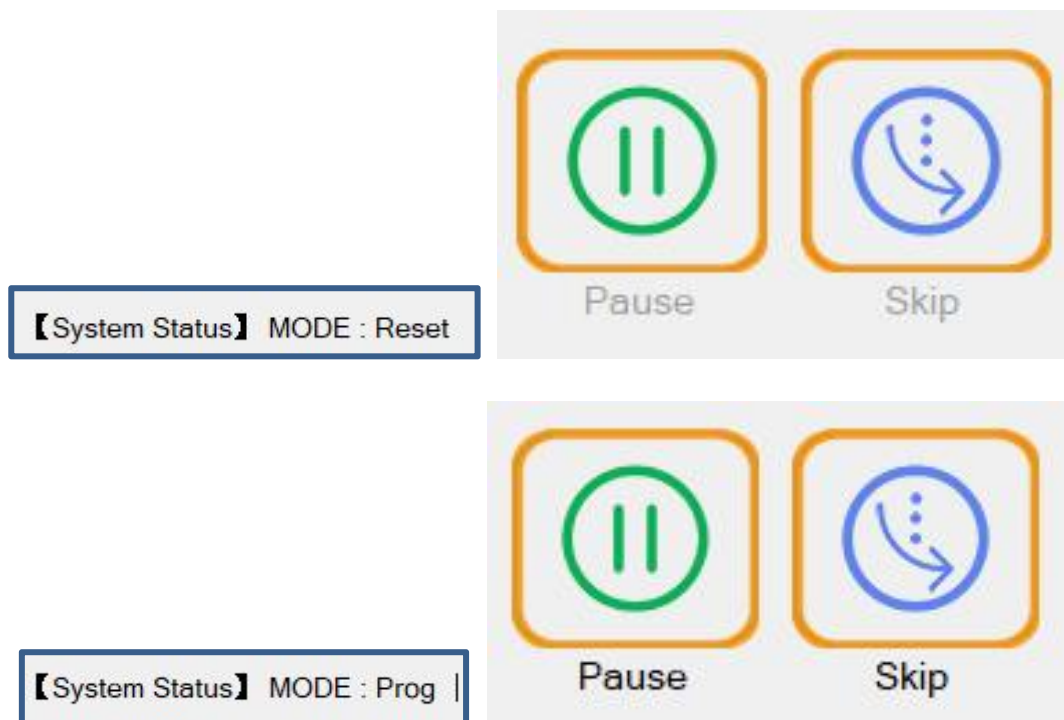


Figure A-1 Button Status Comparison between Standby Mode and Program Mode

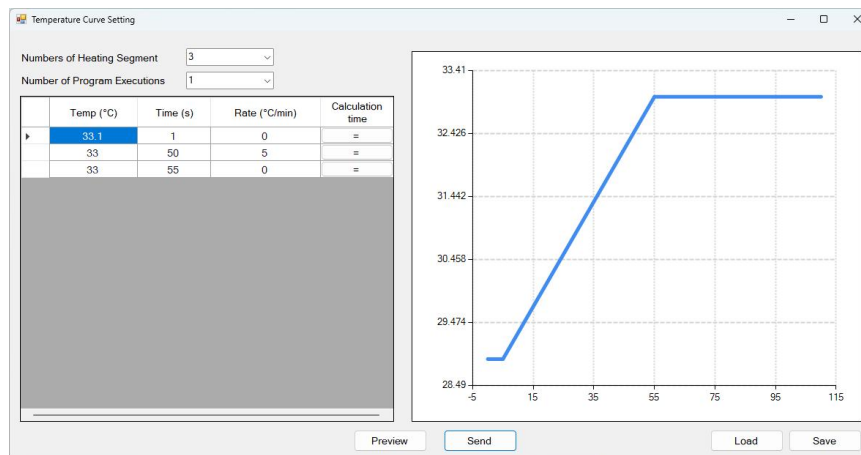
When the temperature program has two or more segments, clicking the [Pause] button will cause the temperature controller to maintain the current setpoint value (SV) without change, stopping execution of subsequent program segments. At this point, the SV curve will be displayed as constant on the interface, while the actual temperature (PV) will continue to approach that SV.

The system will automatically open the [Measurement Settings] dialog, allowing the user to modify the parameters of temperature segments that have not yet been executed.

After completing the parameter settings, click [Send]. The system will restart the new program from the first segment (rather than continuing from the interruption point).

⚠ Note: Due to temperature response lag, it is recommended to set the first segment temperature of the new program close to the current actual temperature (PV) and reserve sufficient hold time to ensure a smooth system transition.

If no modification to the temperature segment parameters is needed, you can click the [×] close button in the upper right corner of the dialog. The system will exit the pause state and continue executing the preset temperature program.



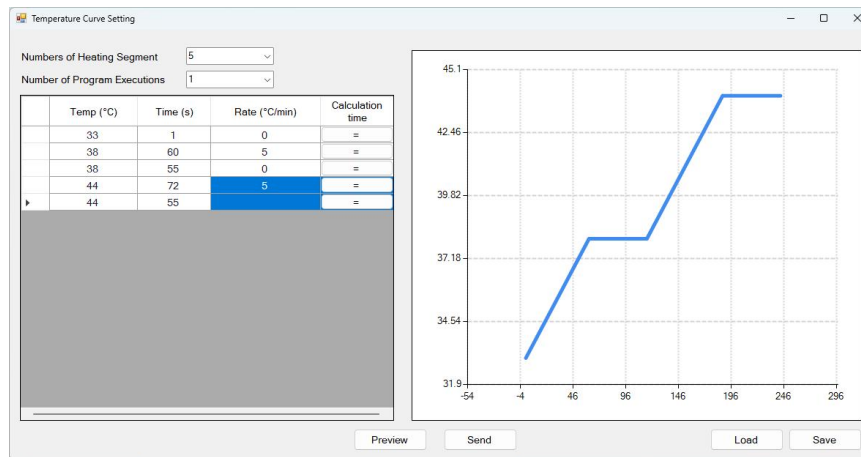


Figure A-2 Measurement Settings Dialog after Pause

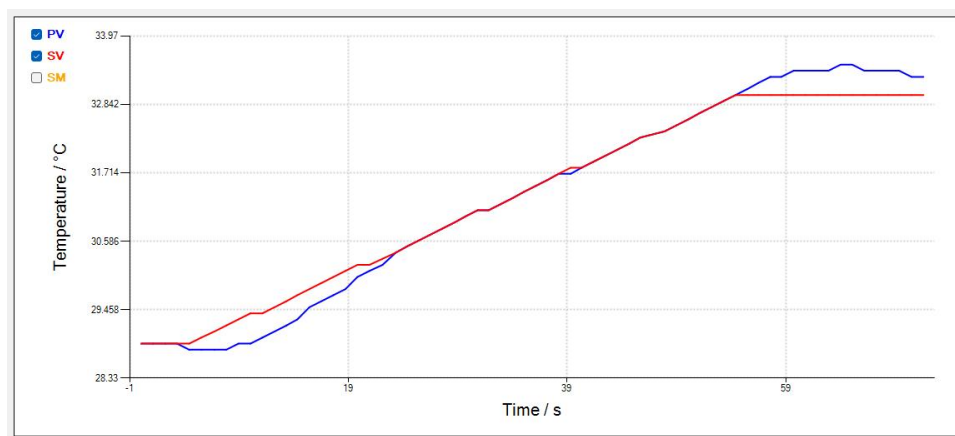


Figure A-3 Temperature Curve Change after Pause (SV Constant, PV Approaching)

As shown in the figure above, after reconfiguring the curve parameters, the duration of the first segment SV is insufficient, causing the PV to not yet reach a stable state before the program proceeds to the second heating segment. Therefore, when re-editing the temperature curve, be sure to reserve sufficient time for the first segment to ensure adequate system stability.

A.2 Skip Function

[Skip] is used to skip the remaining time of the current temperature segment and immediately execute the next program segment.

⚠ **Note:** If there is a significant temperature difference between the current segment and the next segment, avoid frequent or arbitrary use of the skip function to prevent damage to the heating element from sudden power surges.

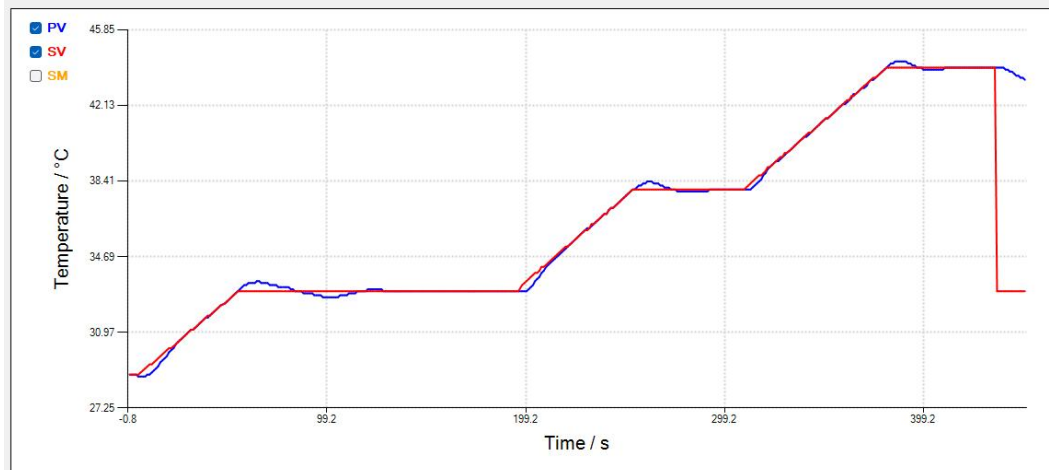


Figure A-4 Skip Function Operation Diagram